DeviceConfig

User Guide

Camera configuration tool (RS232, GigE, Camera Link)

V2.0.0

05 April 2012

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ALLIED Vision Technologies

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Allied Vision Technologies GmbH 04/2012

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Introduction

This **Manual** describes in depth the usage of the DeviceConfig software in combination with AVT Bonito Camera Link cameras.

Alternatively, the software might also be applied to control AVT GigE Vision cameras equipped with a Pleora GigE Vision module (Bigeye P..., Goldeye P... and Pearleye P...). But we recommend to use the serial control interface of AVT AcquireControl software instead.

Note

Please read through this manual carefully.

For more information (e.g. **AcquireControl User Guide)**, see

http://www.alliedvisiontec.com/emea/support/downloads/product-literature.html

Document history

Version	Date	Description
V2.0.0	05.04.12	DeviceConfig User Guide release status

Table 1: Document history

Manual overview

This **manual overview** outlines the contents of each chapter of this manual.

- Chapter *Contacting Allied Vision Technologies* on page 4 lists AVT contact data (phone numbers and URLs) for both:
  - Technical information / ordering
  - Commercial information
- Chapter *Introduction* on page 5 (this chapter) gives you the document history, a manual overview (short description of each chapter) and conventions used in this manual (styles and symbols).
- Chapter Overview on page 8 lists applications of DeviceConfig and the system requirements.
- Chapter Main window on page 12 gives you descriptions how to configure communication ports using the main windows of DeviceConfig.
- Chapter Bonito CL-400 / CMC-4000 Control Dialog on page 21 gives you descriptions how to control Bonito cameras using the Control Dialog of DeviceConfig.

- Chapter Terminal on page 31 gives you descriptions how to directly access the camera and input all commands using the terminal function of DeviceConfig.
- Chapter File manager on page 33 describes how to upload files to the camera using the file manager of DeviceConfig.
- Chapter Script processor on page 35 describes how to control the camera via scripts.
- Chapter Index on page 36 gives you quick access to all relevant data in this manual.

Conventions used in this manual

To give this manual an easily understood layout and to emphasize important information, the following typographical styles and symbols are used:

Styles

Style	Function	Example
Bold	Programs, inputs or highlighting important things	**bold**
Courier	Code listings etc.	`Input`
Upper case	Register	REGISTER
Italics	Modes, fields	*Mode*
Parentheses and/or blue	Links	(Link)

Table 2: Styles

Symbols

Note This symbol highlights important information.

Caution This symbol highlights important instructions. You have to follow these instructions to avoid malfunctions.

www

This symbol highlights URLs for further information. The URL itself is shown in blue.

Example:

http://www.alliedvisiontec.com

Before operation

Target group

This **Manual** is the guide for all users who want to access the extended serial configuration parameters of their cameras with DeviceConfig.

Note

Please read through this manual carefully before operating the camera.

Overview

You can use the **DeviceConfig** application to establish a serial communication channel to an AVT Bonito CL..., Goldeye P..., Pearleye P... or Bigeye P... camera.

The serial communication can be established via a standard RS232 port, a Serial-Over-Camera Link port or a Serial-Over-GigE Port.

In order to use a Serial-Over-Camera Link port it is necessary that the Camera Link grabber manufacturer supplies a *clser*.dll* library.

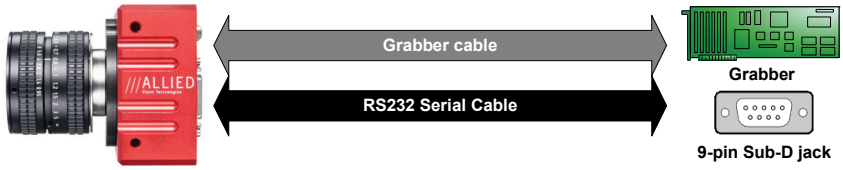
Interface	Diagram
RS232 port	
Serial-Over-Camera Link	
Serial-Over-GigE	

Table 3: Serial communication diagrams (RS232/Camera Link/GigE)

System requirements

PC / Notebook

- Microsoft® Windows XP or Vista or Windows 7 (32-bit and 64-bit)
- Current Intel® processor (dual core or more)
- 2 GB RAM or more

Note

For direct control via RS232 a corresponding serial port must be available in your system.

Camera

- AVT Bonito, Bigeye P..., Goldeye P..., Pearleye P... camera with Camera Link or GigE interface

Interface card

- Cameras with GigE interface: no frame grabber necessary but Gigabit Ethernet NIC (network interface card). Most of todays PC systems / notebooks are equipped with a Gigabit Ethernet port. Make sure, that your system is equipped with a corresponding Gigabit Ethernet NIC (network interface card).
- Cameras with Camera Link interface: CL frame grabber

Note

Ask **AVT Application Engineering Team (Support)** for recommended CL frame grabbers.

Installing DeviceConfig software

To install DeviceConfig perform the following steps:

1. Download **AVT DeviceConfig** zip file (DeviceConfig_Setup_Vx_y_z.zip) from the AVT web site: Unpack it and start the corresponding *.exe.

http://www.alliedvisiontec.com/emea/products/software/windows.html

Figure 1: **AVT DeviceConfig** setup: Welcome

2. In the welcome dialog click **Next.**

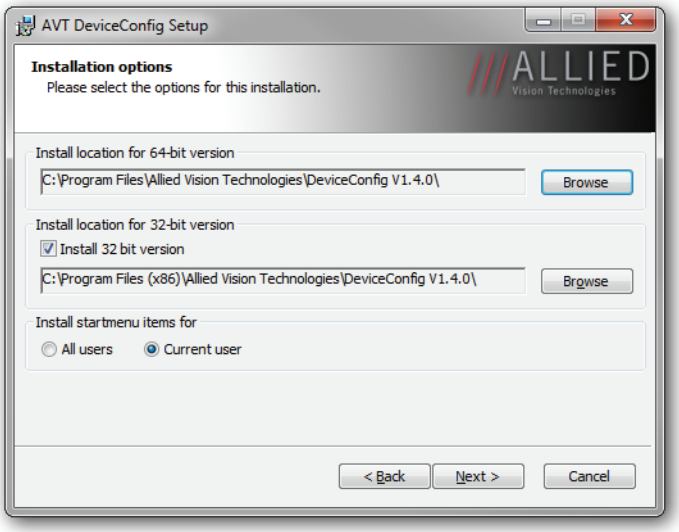


Figure 2: **AVT DeviceConfig** setup: Installation options

3. Select installation options:
   - If the software is installed on a 64-bit operating system, you can choose to install the 32-bit version additionally.
   - Choose whether the startmenu items should be installed for **All users** or for the **Current user** only.
4. Click **Next** and then **Install** to start the installation process.
5. In the final dialog you can choose
   - to start the software directly
   - to show the **Release Notes**
6. Click **Finish** to exit the installer.

Main window

After starting the software the following main window appears:

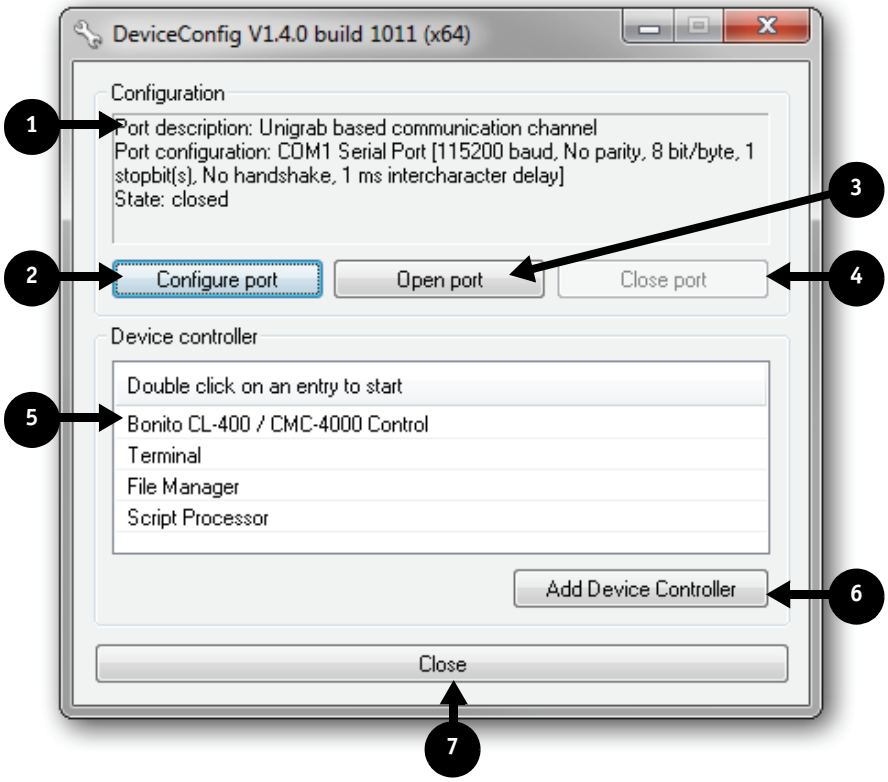


Figure 3: DeviceConfig: Main window

Number	Element	Description
1		Display of the current communication setup and state.
2	Configure port	Opens a dialog for configuring the communication port to the camera.
3	Open port	Opens the selected communication port.
4	Close port	Closes the selected communication port.

Table 4: Main window

Number	Element	Description
5		This list displays all available device controller modules. Currently the following modules are included: • **Bonito CL-400 / CMC-4000 Control Dialog**: Easy to use configuration dialog for the **Bonito** camera series. • **Terminal**: Terminal window to access the camera directly. • **File Manager**: Used to upload files to the camera. • **Script Processor**: Used for a script-based control of the camera, e.g. automatic configuration.
6	Add Device Controller	Adds a new device controller module, i.e. for a new Camera Control Dialog provided by AVT.
7	Close	Close application.

Table 4: Main window

Configure port

This dialog is used to configure the application for a certain communication port.

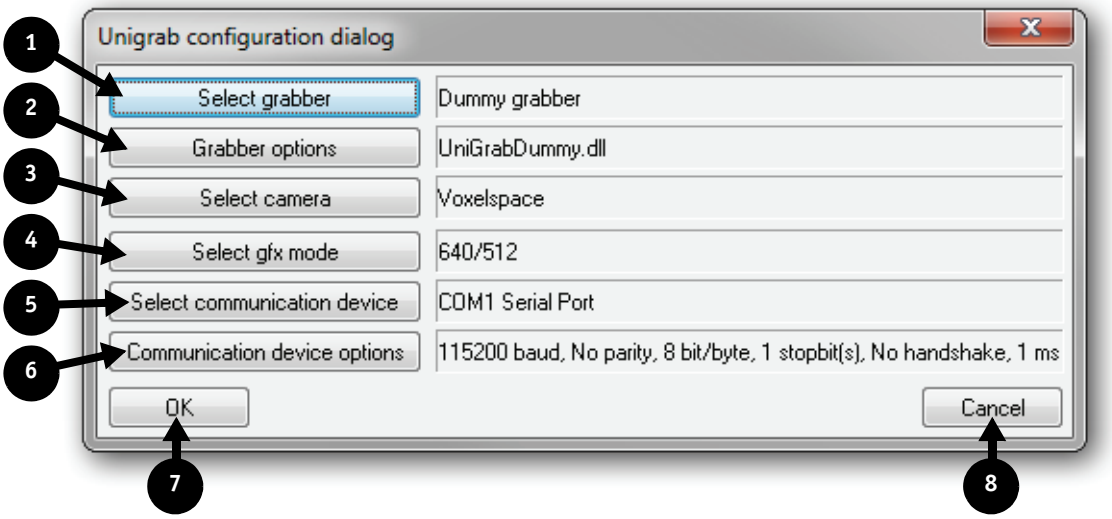


Figure 4: DeviceConfig: Unigrab configuration dialog

Number	Element	Description
1	Select grabber	Click here to change the used grabber / communication channel type.
2	Grabber options	Opens a dialog for additional settings for some grabbers. For GigE grabbers the IP address is set here.
3	Select camera	Selects the camera model. Not relevant here.
4	Select gfx mode	Selects the video mode. Not relevant here.
5	Select communication device	Selects which communication channel/device should be used.
6	Communication device options	Adjustments regarding the communication device, e.g. baud rate.
7	OK	Confirmation of adjustments and closing of dialog.
8	Cancel	Rejection of adjustments and closing of dialog.

Table 5: DeviceConfig: Unigrab configuration dialog

In dependence of the communication port the following adjustments should be used:

Communication port	Element	Description
RS232 Port	Select Grabber	Dummy grabber.
	Grabber Options	Don't care.
	Select Camera	Don't care.
	Select gfx mode	Don't care.
	Select communication device	System COM Port you want to use.
	Comm. device options	Settings depend on the used camera. Default is 115200 baud, no parity, 8 bit, 1 stop bit, no handshake, delay: 1 ms.
Serial-Over-GigE (Pleora iPORT™)	Select Grabber	Gigabit Ethernet (Pleora iPORT)
	Grabber Options	Select the camera you want to access here.
	Select Camera	Don't care.
	Select gfx mode	Don't care.
	Select communication device	Pleora Camera Link Serial Port
	Comm. device options	8N1-115200
Serial-Over-Camera Link	Select Grabber	Dummy grabber.
	Grabber Options	Don't care.
	Select Camera	Don't care.
	Select gfx mode	Don't care.
	Select communication device	Click **New** and select **Camera Link port**. See Chapter *Select communication device* on page 16.
	Comm. device options	Settings depend on the used camera. Default is 115200 baud, no parity, 8 bit, 1 stop bit, no handshake, delay: 1 ms.

Table 6: Adjustments depending on communication port

Select communication device

To select the desired communication device use this dialog.

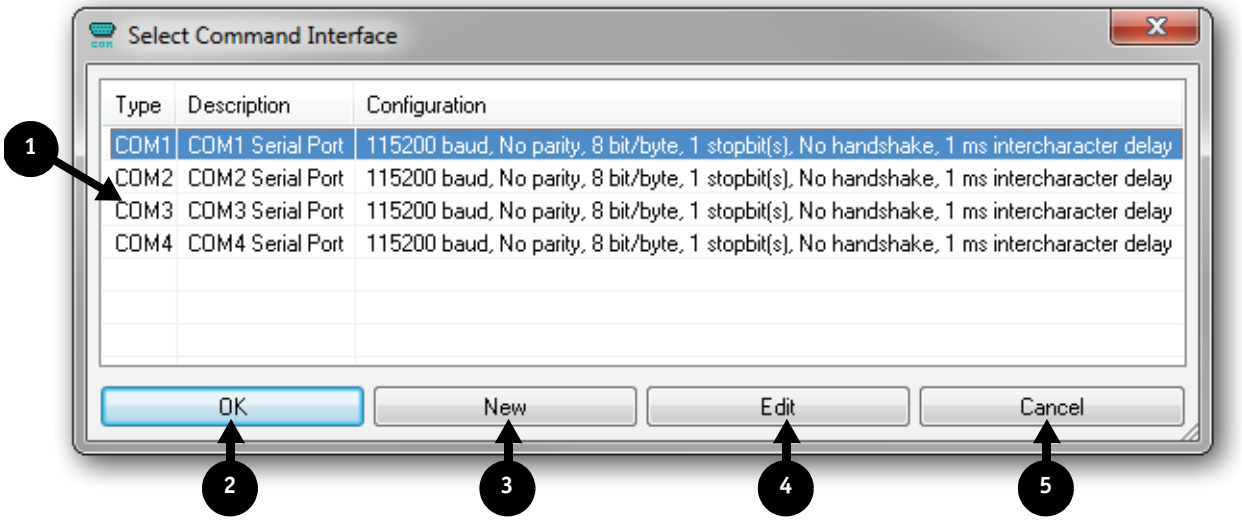


Figure 5: DeviceConfig: Select Command Interface

Number	Element	Description
1		Lists all available communication interfaces.
2	OK	Confirms adjustments and closes dialog.
3	New	Create a new communication device. You can either create a new system serial port or a Camera Link serial port (see Chapter *Serial-Over-Camera Link* on page 19).
4	Edit	Edit settings for currently selects communication device.
5	Cancel	Rejects adjustments and closes dialog.

Table 7: DeviceConfig: Select Command Interface

Communication device options

RS232 port

To configure a system COM port, use the following dialog:

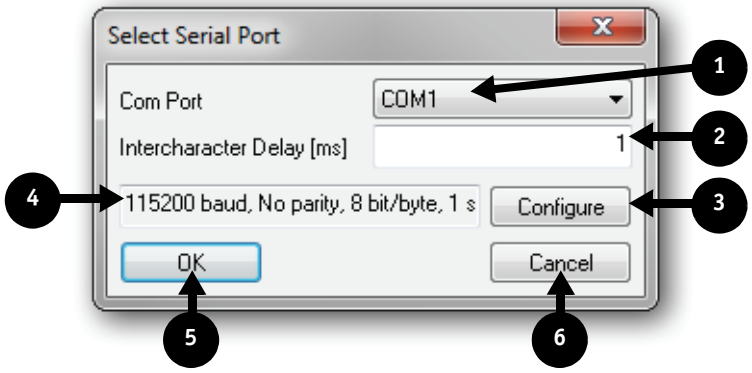


Figure 6: DeviceConfig: Select Serial Port

Number	Element	Description
1	Com Port	Selects the COM port to configure.
2	Intercharacter delay [ms]	Adjusts the delay between characters.
3	Configure	Opens the system dialog for COM port setup.
4		Current configuration
5	OK	Confirms adjustments and closes dialog.
6	Cancel	Rejects adjustments and closes dialog.

Table 8: DeviceConfig: Select Serial Port

Serial-Over-GigE

To configure a Pleora GigE port, use the following dialog:

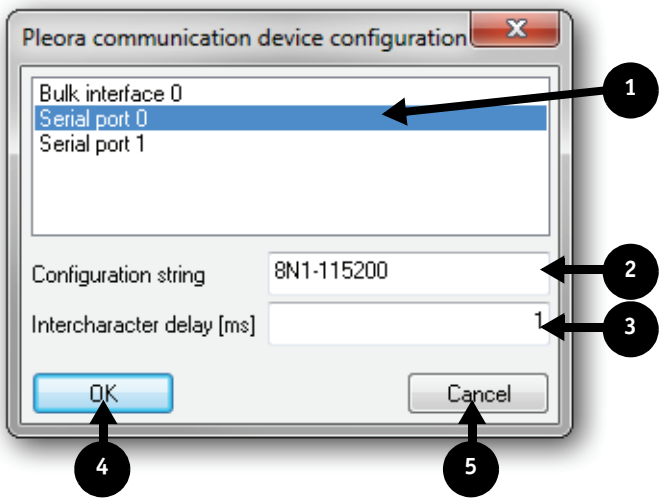


Figure 7: DeviceConfig: Configure Pleora communication device

Number	Element	Description
1		Lists all available ports. The default port is **Serial port 0**.
2	Configuration string	Configuration string for the selected port. The default string is **8N1-115200**.
3	Intercharacter delay [ms]	Adjusts the delay between characters.
4	OK	Confirms adjustments and closes dialog.
5	Cancel	Rejects adjustments and closes dialog.

Table 9: DeviceConfig: Configure Pleora communication device

Serial-Over-Camera Link

In order to use a Serial-Over-Camera Link channel the Camera Link grabber manufacturer has to provide a standardized library.

The naming scheme of these libraries is **clser*.dll**. After selecting the library, all available grabber communication channels are listed within the dialog.

Note

The channels are only listed when the grabber is available.

The architecture of the selected library must fit to the architecture of the DeviceConfig application:

- The **32**-bit (x86) application needs a **32**-bit clser*.dll.
- The **64**-bit (x64) application needs a **64**-bit clser*.dll.

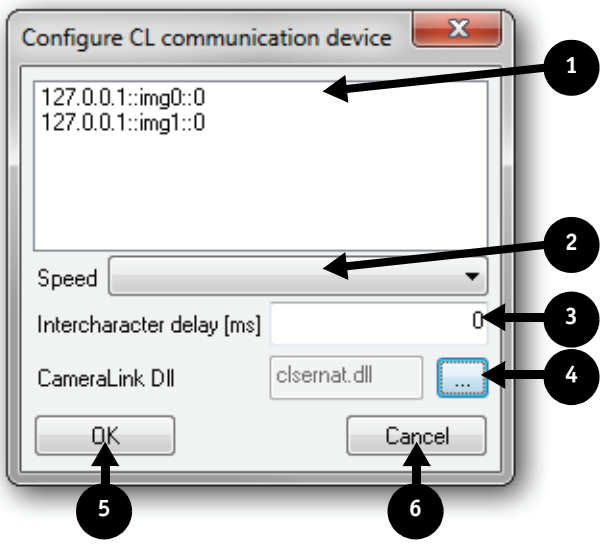


Figure 8: DeviceConfig: Configure CL communication device

Number	Element	Description
1		Lists all available ports the grabber supplies. The name of the port depends on the grabber manufacturer.
2	Speed	Used baud rate. The default value is 115200 baud.
3	Intercharacter delay [ms]	Adjusts the delay between characters.
4	...	Browse for the Serial-Over-Camera Link library.
5	OK	Confirms adjustments and closes dialog.
6	Cancel	Rejects adjustments and closes dialog.

Table 10: DeviceConfig: Configure CL communication device

Depending on the used Camera Link frame grabber the **clser*.dll** is located in different folders:

Camera Link frame grabber	Used folder for clser*.dll
National Instruments	C:\Windows\system32\clsernat.dll or C:\Windows\SysWOW64\clsernat.dll
Silicon Software	C:\Windows\system32\clserme4.dll or C:\Windows\SysWOW64\clserme4.dll or C:\CameraLink\clserme4.dll
BitFlow	C:\Program Files\BitFlow SDK x.xx\Bin
Matrox	C:\Windows\system32\clsermtx.dll or C:\Windows\SysWOW64\clsermtx.dll

Table 11: Used folders of different Camera Link frame grabbers

Bonito CL-400 / CMC-4000 Control Dialog

This module allows complete control over the Bonito camera family. Every serial command described in the camera head manual is mapped to a control, which makes it easy to adjust the settings.

The settings are divided into **Image Parameters** and **Timer & Hardware Parameters**. All changes made within the dialog directly affect the camera.

Image Parameters

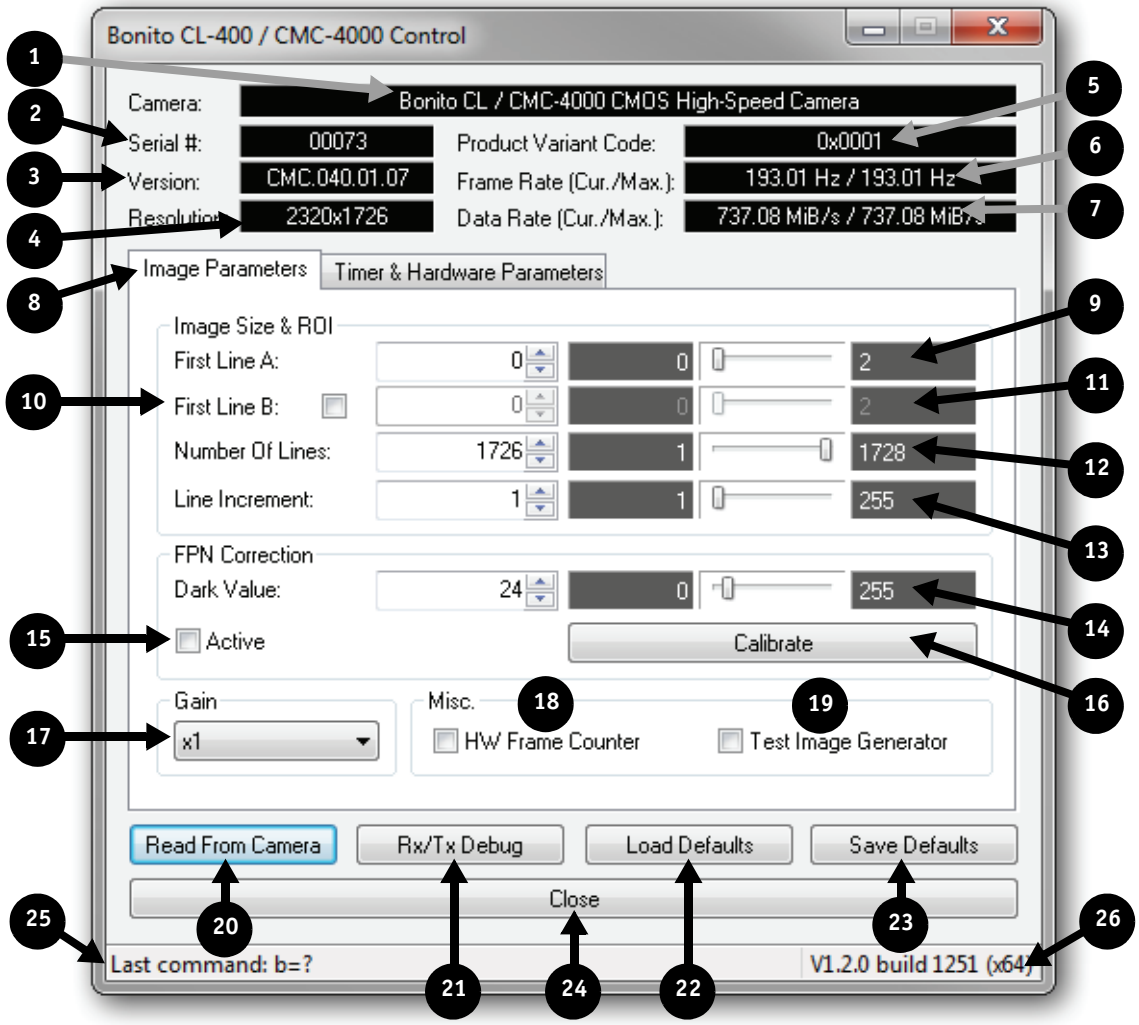


Figure 9: Bonito CL-400 / CMC-4000 Control Dialog

Number	Element	Description
1	Camera	Displays the detected camera type. In case a communication error occurs, it is displayed here, too.
2	Serial #	Serial number of the camera
3	Version	Firmware version of the connected camera
4	Resolution	Resulting resolution of the camera

Table 12: Bonito CL-400 / CMC-4000 Control Dialog: Image Parameters

Number	Element	Description
5	Product variant code	Internal ID: camera variant
6	Frame Rate (Cur./Max.)	Current and maximum frame rate that can be achieved with the current configuration.
7	Data Rate (Cur./Max.)	Current and maximum data rate that can be achieved with the current configuration.
8	Image Parameters	Tab selector for all image parameters
9	First Line A	First line address for ROI A. The address counter starts with 0. The value can be set directly or with a slider control. Besides the slider control the minimum and maximum values are displayed. **Right click on the slider to directly set presets for top, center and bottom.**
10	First Line B	Enables or disables the double ROI mode. In this mode the camera outputs two equally sized regions of interest.
11	First Line B	First line address for ROI B. The address counter starts with 0. The value can be set directly or with a slider control. Besides the slider control the minimum and maximum values are displayed.
12	Number Of Lines	The number of lines per frame. Besides the slider control the minimum and maximum values are displayed. **Right click on the slider to directly set a certain frame rate.**
13	Line Increment	The line address increment value is added to the current address at the end of each line read out from the sensor. Setting values greater than one will skip lines accordingly. In conjunction with a reduced number of lines this is useful to gain higher frame rates without diminishing the field of view. Besides the slider control the minimum and maximum values are displayed.
14	Dark Value	This value is added after subtraction of the fixed pattern noise (FPN) correction data. The offset is used to adjust the dark level and avoid clipping of pixels to black in low-light situations. It is only applied when the fixed pattern noise correction is active. Besides the slider control the minimum and maximum values are displayed.
15	Active	Activates or deactivates the fixed pattern noise (FPN) correction.
16	Calibrate	The fixed pattern noise may increase after longer time of operation or major changes in temperature. For best results, prevent light reaching the sensor during recalibration. After calibrating the camera the correction is automatically enabled.
17	Gain	Sets the digital gain level of the camera.
18	HW Frame Counter	Enables or disables the hardware frame counter overlay. This might be necessary if the used grabber software needs a synchronization method when working in the 2 x 10-tap mode.
19	Test Image Generator	Enables or disables the internal test image generator of the camera.

Table 12: Bonito CL-400 / CMC-4000 Control Dialog: Image Parameters

Number	Element	Description
20	Read From Camera	Reloads all current parameters from the camera.
21	Rx/Tx Debug	Opens a debug window to display all commands that were sent while using the dialog.
22	Load Defaults	Load default parameters from camera memory. **Right click to set all parameters to factory defaults.**
23	Save Defaults	Saves current parameters into camera memory.
24	Close	Closes the window.
25	Status bar (left)	Last command sent to the camera
26	Status bar (right)	Dialog version

Table 12: Bonito CL-400 / CMC-4000 Control Dialog: Image Parameters

Timer & Hardware Parameters

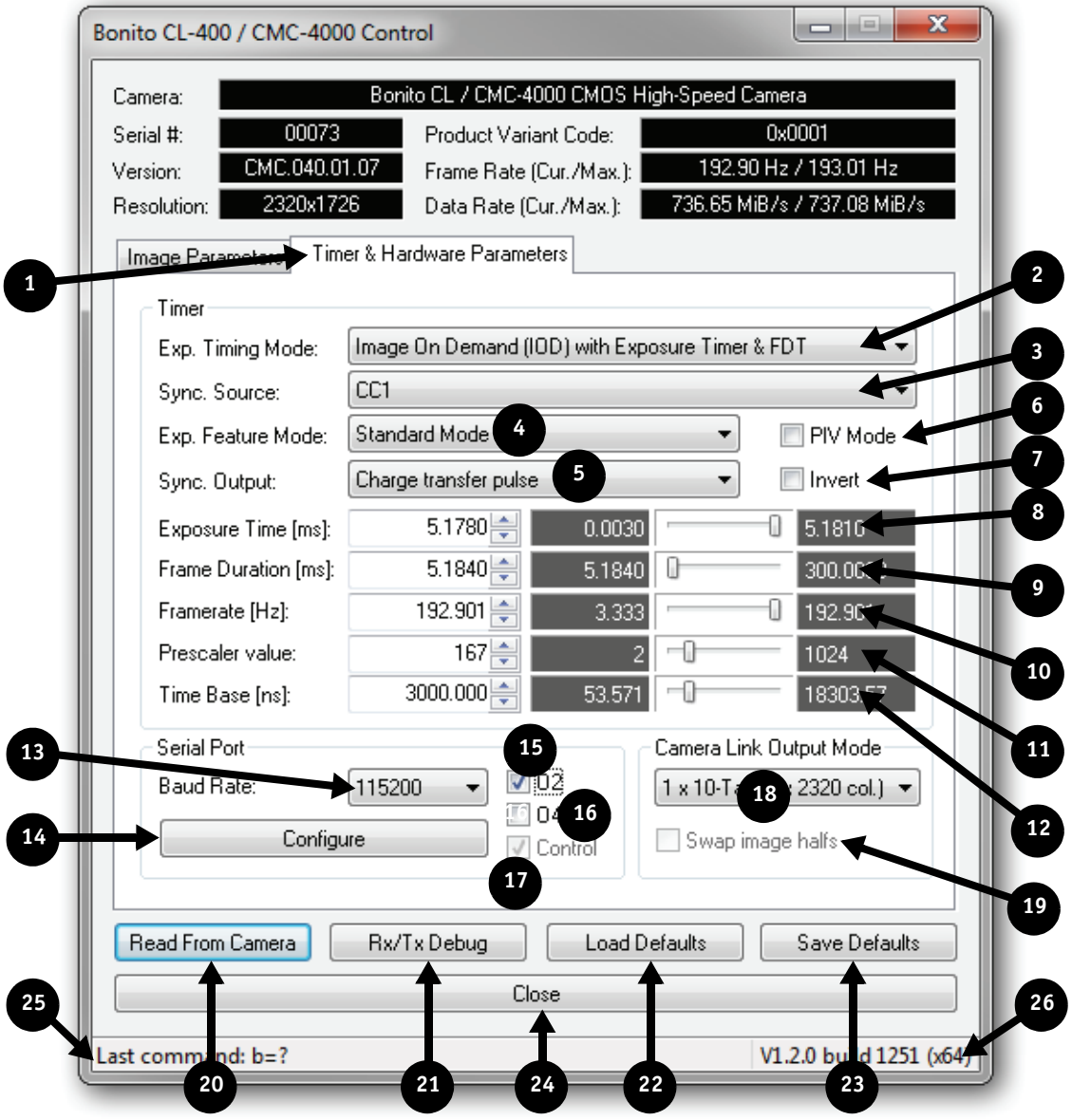


Figure 10: Bonito CL-400 / CMC-4000 Control Dialog: Timer & Hardware Parameters

Number	Element	Description
1	Timer & Hardware Parameters	Tab selector for timing and hardware related parameters
2	Exposure Timing Mode	Set of the exposure control mode Possible values are: • **Continuous** The camera outputs images as fast as possible in a free running mode. • **Image On Demand (IOD)** The exposure is directly controlled by an externally applied signal. • **Image On Demand (IOD) with Exposure Timer** The exposure is started by an externally applied signal and the time is controlled by the parameter *Exposure Time*. • **Image On Demand (IOD) with Exposure Timer and FDT** This mode is also free-running, but exposure time and frame duration is set using the parameters *Exposure Time* and *Frame Duration* accordingly. **Note** For detailed descriptions of these modes: see camera manual.
3	Trigger Source / Sync. Source / Exp. Control Source	This parameter selects the signal source for triggering and exposure control.
4	Exp. Feature Mode	Controls the way the exposure signal is used: • **Standard mode** Normal operating mode • **Enhanced full well (3T) mode** The full frame shutter is not available in this mode. The sensor operates in rolling shutter mode with an effective shutter time that equals the frame duration. • **Permanent exposure mode** Used to maximize the exposure time. Here the exposure time equals the frame duration. **Note** For detailed descriptions of these modes: see camera manuals.

Table 13: Bonito CL-400 / CMC-4000 Control Dialog: Timer & Hardware Parameters

Number	Element	Description
5	Sync. Output	Configures the synchronization output at pin 6 of the control connector: • **Effective sensor exposure** • **Charge transfer pulse** Active for one line duration at the end of exposure. The end of this pulse marks the end of exposure and at the same time the start of sensor readout. • **Effective sensor readout** • **3: Exposure phase** Contrary to **Effective sensor exposure** this setting shows the **exposure phase** of the state machine and not the effective exposure of the sensor. This allows to synchronize external devices even if the sensor is in permanent exposure mode. **Note** For detailed descriptions of these modes: see camera manuals.
6	PIV Mode	**Particle Image Velocimetry (PIV) mode:** If enabled, the camera outputs two images per trigger event. **Note** For detailed descriptions of these modes: see camera manuals.
7	Invert	Inverts the logic levels of the sync output.
8	Exposure Time	Exposure time setting The minimum and maximum values depend on the frame duration. Besides the slider control the minimum and maximum values are displayed.
9	Frame Duration	Frame duration setting Besides the slider control the minimum and maximum values are displayed.

Table 13: Bonito CL-400 / CMC-4000 Control Dialog: Timer & Hardware Parameters

Number	Element	Description
10	Framerate	Current frame rate setting $$\text{Frame rate} = \frac{1}{\text{Frame duration}}$$ Formula 1: Frame rate formula Besides the slider control the minimum and maximum values are displayed.
11	Prescaler Value	Decimal timebase parameter K (See camera manual for further information.) Besides the slider control the minimum and maximum values are displayed. **Right-click to open menu with default values.**
12	Time Base	Time base for all other timing related parameters of the camera. **Right-click to open menu with default values.** The timebase is defined as: $$TB = \frac{K+1}{56\ \text{MHz}}$$ Formula 2: Time base formula
13	Baud Rate	Baud rate setting of the **camera** After changing this value the DeviceConfig application has to be configured to the same baud rate by clicking on the **Configure** button.
14	Configure	Access to the serial configuration of the DeviceConfig **application**
15	O2/CL1	Enables or disables the serial port on Camera Link connector O2 and accordingly CL1 (using 200fps model).
16	O4/CL2	Enables or disables the serial port on Camera Link connector O4 and accordingly CL2 (using 200fps model).
17	Control	The serial port on the 15-pin D-SUB control connector is always activated.

Table 13: Bonito CL-400 / CMC-4000 Control Dialog: Timer & Hardware Parameters

Number	Element	Description
18	Camera Link Output Mode	Controls the Camera Link output mode. Possible values are: • **1 x 10-tap (1 x 2320 columns)** Single channel mode (193 frames per second with line length of 2320 pixels). The camera utilizes one Camera Link 10-tap channel. It allows only half of the maximum frame rate but also produces less noise in the image because the sensor clock frequency is reduced. • **2 x 10-tap (2 x 1160 columns)** Dual channel mode (386 frames per second with line length of 2 x 1160 = 2320 pixels). The image is split vertically into a left and a right half. Thus each half has a horizontal size of 1160 pixels and is output separately on its own Camera Link 10-tap channel. The left half travels via the left Camera Link channel at the connectors 02 / 01 (or CL1 / CL2) and the right half travels via 04 / 03 respectively. • **2 x 10-tap (2 x 1120 columns)** Dual channel mode (386 frames per second with line length of 2 x 1120 = 2240 pixels). For frame grabber compatibility reasons some pixel columns at the left and right side (of the full image) are dropped so that the line length of each half image is divisible by 16.
19	Swap image halfs	If **dual-channel mode** is used: Swaps the left and right image halfs.
20	Read From Camera	Reloads all current parameters from the camera.
21	Rx/Tx Debug	Opens a debug window to display all commands that were sent while using the dialog.
22	Load Defaults	Loads default parameters from camera memory. **Right-click to set all parameters to factory defaults.**
23	Save Defaults	Saves current parameters into camera memory.
24	Close	Closes the window.
25	Status bar (left)	Last command sent to the camera
26	Status bar (right)	Dialog version

Table 13: Bonito CL-400 / CMC-4000 Control Dialog: Timer & Hardware Parameters

Debug dialog

The debug dialog displays all serial communication between the **Bonito CL-400 / CMC-4000 Control Dialog** and the camera.

Figure 11: Bonito CL-400 / CMC-4000 Debug Dialog

Number	Element	Description
1		Serial command output window: Special ASCII characters are displayed in braces. **White:** Character sent from the application to the camera. **Bright red:** Special character sent from the application to the camera. **Grey:** Characters received from the camera. **Dark red:** Special characters received from the camera.
2	Copy	Copies the content of the output window into the Windows clipboard.
3	Clear	Deletes the content of the output window.
4	Close	Closes the dialog.

Table 14: Bonito CL-400 / CMC-4000 Debug Dialog

Terminal

With the terminal window you can directly access the camera and input all commands described in the camera manual. This dialog behaves similar to the Windows HyperTerminal application.

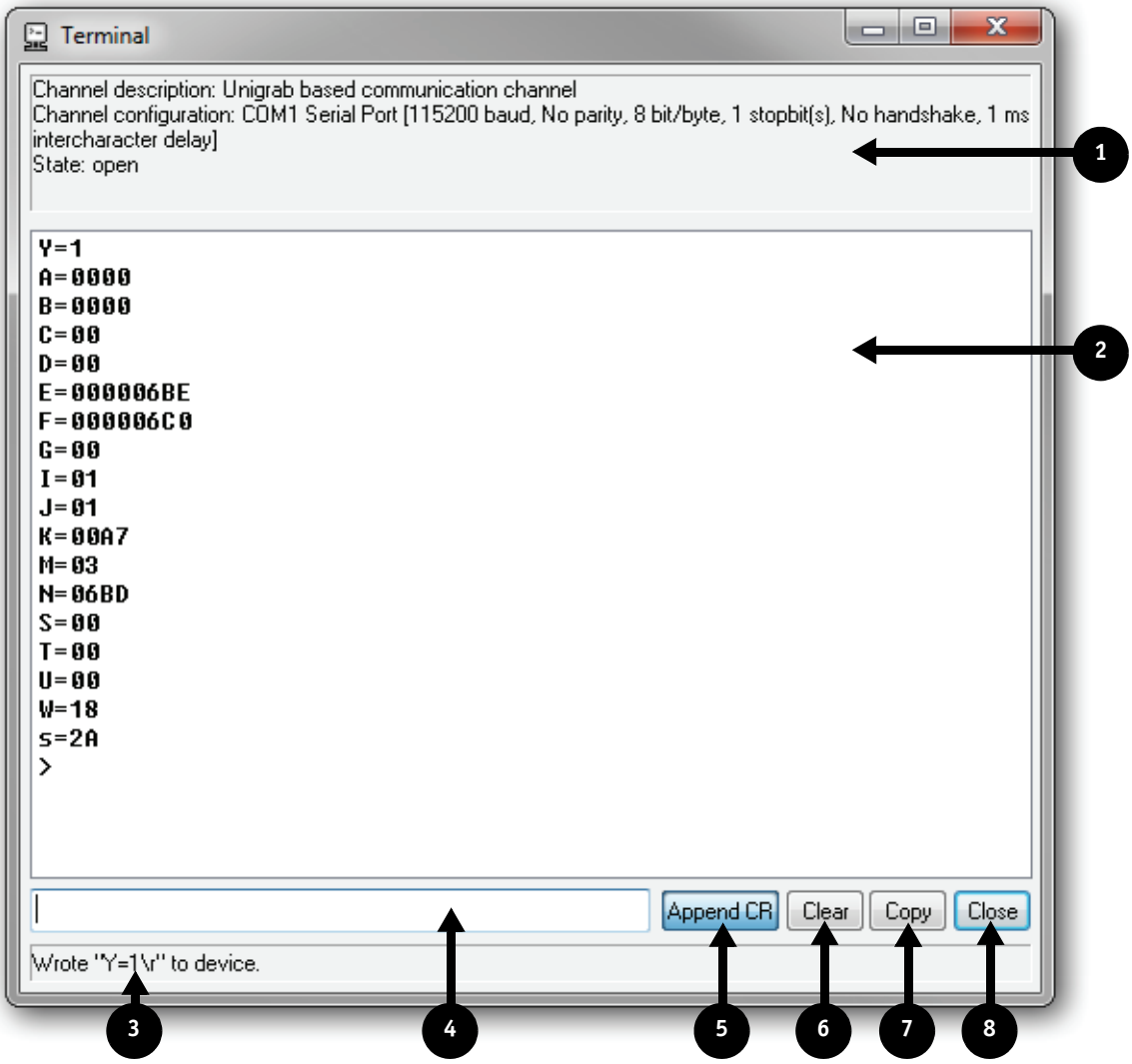


Figure 12: DeviceConfig: Terminal

Number	Element	Description
1		Information about the used communication channel
2		Serial command output window

Table 15: DeviceConfig: Terminal

Number	Element	Description
3		Status bar with information about the last command send to the camera
4		Input line for the command Use the cursor Up/Down key to access the command history.
5	Append CR	Automatically appends a *Carriage Return* character (CR) to the command before sending it to the camera. Default setting is ON.
6	Clear	Deletes the content of the output window.
7	Copy	Copies the content of the output window into the Windows clipboard.
8	Close	Closes the dialog.

Table 15: DeviceConfig: Terminal

File manager

You can use the file manager dialog to upload specific config files to a camera: e.g. correction data files for cameras of Goldeye or Pearleye series.

Caution

Consult **AVT Application Engineering Team (Support)**, before using file manager.

Be very careful using the file manager: You might configure the camera in a way, that it has to be recalibrated in the AVT factory.

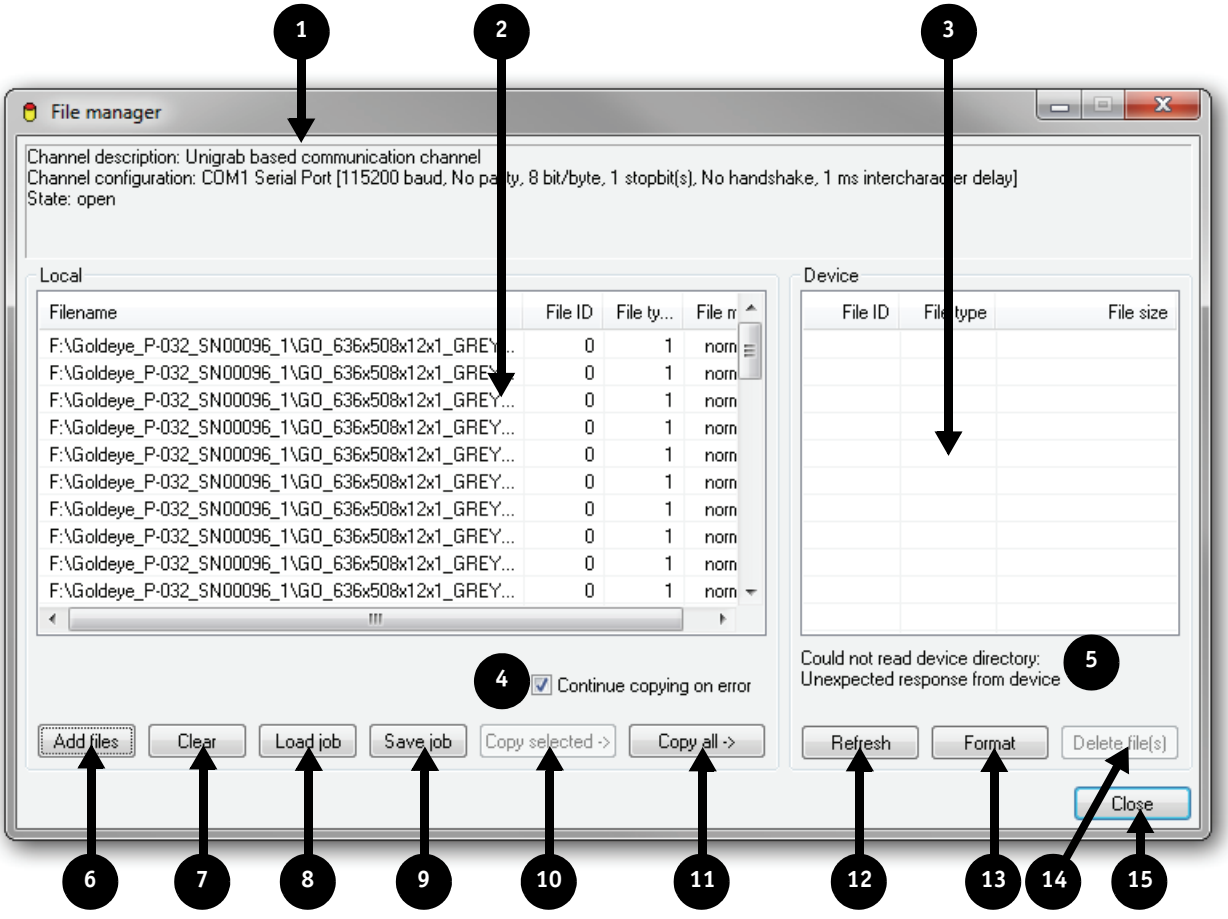


Figure 13: DeviceConfig: File manager

Number	Element	Description
1		Information about the used communication channel.
2		List of the local file that will be uploaded to the camera.
3		List of the files already stored in the camera memory.
4	Continue copying on error	When this check box is not selected the copy process will stop in case an error occurs.
5		Info message
6	Add files	Adds one or more files to the list.
7	Clear	Clears the file list.
8	Load job	Loads job file. A job file contains a list of local files that will be uploaded to the camera.
9	Save job	Saves file list as job file for later use.
10	Copy selected	Copies only the selected local files to the camera memory.
11	Copy all	Copies all listed local files to the camera memory.
12	Refresh	Refreshes file listing.
13	Format	Formats camera file system.
14	Delete file(s)	Deletes selected files from camera file system.
15	Close	Closes the dialog.

Table 16: DeviceConfig: File manager

Script processor

The script processor is used for a script-based control of the camera.

Note Consult **AVT Application Engineering Team (Support)**, before using the script processor.

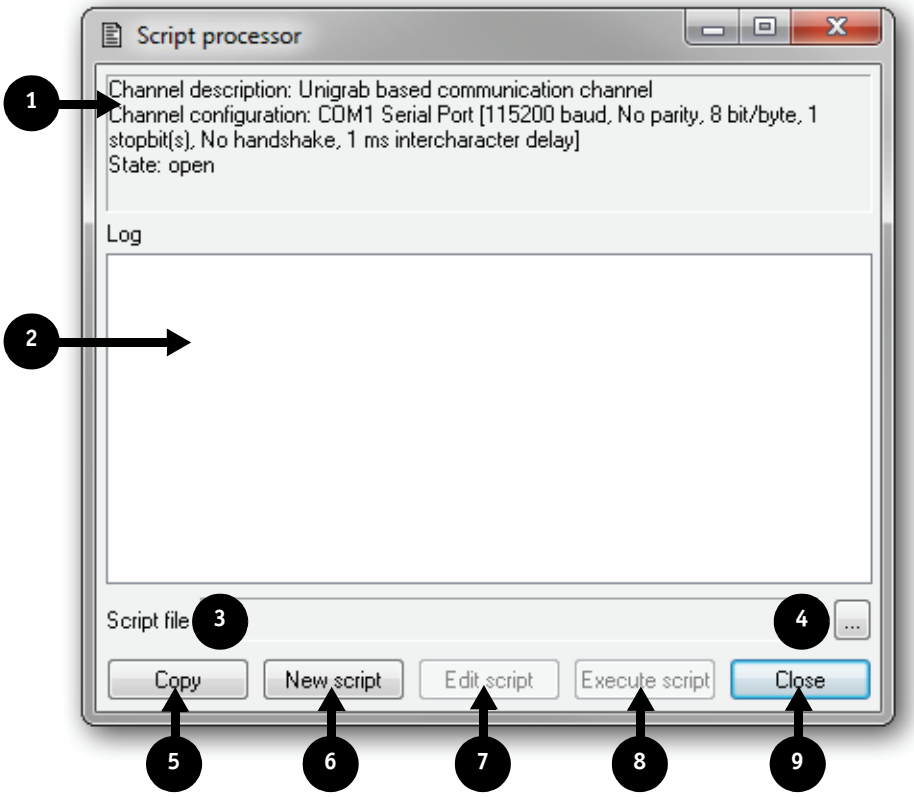


Figure 14: DeviceConfig: Script processor

Number	Element	Description
1		Information about the used communication channel
2	Log	Output of the script
3	Script file	Filename and path of the used script file
4		Browse for a new script file.
5	Copy	Copies the script output to the Windows clipboard.
6	New Script	Creates a new script file on hard disc.
7	Edit script	Opens a text editor to edit the script file.
8	Execute script	Executes loaded script file.
9	Close	Closes the dialog.

Figure 15: DeviceConfig: Script processor

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